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Study of shape transitions in the neutron-rich Os isotopes

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The nuclei with A~190 between Hf and Pt exhibit a great variety of nuclear phenomena, including K-isomerism, triaxiality and shape transition across the isotopic chain. This region has been in fact a crucial testing ground for the nuclear models aspiring at the description of such complex nuclear phenomena. Of particular interest is the transition from axially symmetric deformed, prolate (gamma = 0 deg.) to oblate (gamma = 60 deg.) shapes in the neutron-rich Os isotopic chain. While a study by Wheldon et al. [1] of the neutron-rich 194Os nucleus populated via deep-inelastic reactions suggests a prolate shape for its yrast states, Podolyak et al. [2] proposed an oblate shape for the ground state of 198Os by comparing the excitation energies of the first and second 2+ states. The ground state of $196Os, the even-even isotope lying between the two previously mention ones, is predicted to be prolate, oblate or gamma-soft by different state-of-the-art nuclear models. This region of the Segrè chart is very difficult to study experimentally, only fragmentation and multi-nucleon-transfer reactions can be used to populate neutron-rich nuclei in this region, hence the knowledge for this nucleus is limited to two excited states without any known gamma transition [3]. To further elucidate this shape transition, the key nucleus 196Os was investigated in-beam using the AGATA demonstrator and the large acceptance heavy ion spectrometer PRISMA at LNL, Italy. A two nucleon transfer from a 198Pt target to a stable 82Se beam was utilised to populate medium-high spin states of 196Os. The ongoing data analysis for AGATA and PRISMA spectrometer will be discussed together with the latest results for 196Os.

[1] C. Wheldon et al., Phys. Rev. C63, (2000) 011304(R).
[2] Zs. Podolyak et al., Phys. Rev. C79, (2009) 031305.
[3] P.D. Bond et al., Phys. Lett. B130, (1983) 167.

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